



CROSS DISPERSION PRISM SENSOR

What is it?

The Cross Dispersion Prism sensor, according to William Ewing, one of the principal developers, is a passive electro-optical infrared sensor that allows for continuous surveillance of an area. It will be used to detect, locate, identify and classify energetic events, such as explosions, in real-time, through an application of rapid spectral and temporal sensing. During the past two years, the Air Force Research Laboratory engineers at Hanscom AFB, Mass., have developed this tool that will provide troops superior battlefield awareness with real-time threat information.

How does it work?

Using pseudo-imaging, the sensor registers an explosion's spectral/temporal signature, or fingerprint. Then it identifies the explosion and classifies it based on information compiled by the lab in a library of spectral images. The sensor also reveals the location, allowing battlefield commanders to make decisions based on highly accurate, reliable information.

"The CDP tells the story of how an explosion developed," said Dr. Ewing. "It allows us to tell the difference between

artillery, bombs, small arms fire, etc. We used to use only temporal signatures to determine the details of these events, so this technology offers a significant advantage over what has been done before."

Considered a wide field-of-view sensor, it's a unique optical assembly that senses light from the visible through the infrared range by placing a pair of prisms in front of a high-speed commercial camera (400 to 500 images per second). The data is then processed by a computer and calculates a probability of what the event was and its location. In addition, the system is fairly inexpensive and needs little maintenance. In tests so far, the system has proven highly accurate and has a low false-alarm rate, which could lead to several potential applications.

The original idea was to place the sensor on top of a pole for surveillance of a perimeter, like around the Green Zone in Iraq, or on a vehicle. But, when officials saw how well the sensor performed, the potential uses grew.

How will it be used?

One primary application will be to equip the system on unmanned aerial vehicles,

which could help the UAV conduct surveillance of a broader area, providing greater visibility and better situational awareness. The system has already been tested aboard a Naval Air Systems Command AeroStar UAV in 2005, at Patuxent River Naval Air Station, Md.

Other applications could be in missile defense, early launch detection, missile typing, and bomb damage and kill assessment, as well as astronomy, space observation and nuclear testing verification, said program engineers.

The lab's classification of larger threats, including foreign and domestic long-range missiles, will begin in spring 2006.

What's ahead

"The great thing is that we are ahead of schedule and on budget," said Mr. Darin Leahy, program manager. "When we first started, we were a little skeptical about how well it would work, but, in a month, we [had the first one] working really well. With everything that we have seen so far, this technology will be a great benefit to the Air Force as well as other services."

Final testing is scheduled for September at U.S. Army Yuma Proving Ground, Ariz.